

REMARKS

INTRODUCTION

In accordance with the foregoing, the drawings, specification and claims 19, 20 and 39 have been amended. Claims 44-46 have been cancelled. Claims 2, 11, 27, 29-36, 43 and 47-54 have been withdrawn. Claims 1, 3-10, 12, 19-26, 28 and 37-42 are pending and under consideration.

AMENDMENTS TO THE DRAWINGS AND SPECIFICATION

Paragraph [0028] of the specification and Figure 3 of the drawings have been amended for the purpose of clarity. The electrical charger 23 charges the photosensitive drum 27 to raise an electrical potential of the photosensitive drum 27. Also, exposing the photosensitive drum 27 with LSU 25 are the next step of the charging of the photosensitive drum 27. No new matter has been added.

CLAIM REJECTIONS

Claims 1, 3-10, 12, 19-26, 28, 37-42 and 44-46 were rejected under 35 USC 103(a) as being unpatentable over Yamada et al. (US 6,089,766) (hereinafter "Yamada") in view of Miyazaki et al. (US 6,408,156) (hereinafter "Miyazaki").

Claims 1, 3-10 and 12

Claim 1 recites: "...developing a registration pattern with predetermined colors by overlapping a left-half pattern and a right-half pattern of a second pattern, and a left-half pattern and a right-half pattern of a first pattern, which are arranged symmetrically to a center, respectively, in a scanning direction..." The Office Action relies on Figure 7 of Yamada to show this feature of claim 1.

Figure 7 of Yamada shows various test patterns. The first set of test patterns are constructed by having each printhead print, alternatively, a "one dot--one space", "two dots--two spaces", or "four dots--four spaces" image (Figures 7A, 7C and 7E). A corresponding set of patterns is created by transversely shifting the output of one printhead for each of the above patterns by one, two, and four pixels, respectively (Figures 7B, 7D and 7F). Yamada 9:64-10:4 and Figure 7.

Further in Yamada, the density of the printed test patterns is measured by sensor 31. The location of the sensor measurement is shown in each pattern of Figure 7. The ink coverage

ratio (area factor) per unit area between the patterns having a shift and the patterns without a shift is quite different. Hence, even if a sensor with a poor sensitivity is used, the relative differences in coverage are easily detected. Furthermore, a user can easily notice the differences visually. Yamada, 10:5-10:11.

However, the text patterns shown in Figure 7 of Yamada, or discussed in the specification of Yamada, do not disclose the technical feature of claim 1 where a left-half pattern and a right-half pattern of a second pattern, and a left-half pattern and a right-half pattern of a first pattern, that are arranged symmetrically to a center are overlapped. Instead, in Yamada, a corresponding set of patterns is created by transversely shifting the output of one printhead for each of the above patterns by one, two, and four pixels. Further, this deficiency in Yamada is not cured by the secondary reference Miyazaki.

This technical feature of claim 1 provides for forming a first pattern, in which the left-half pattern and the right-half pattern are symmetrically arranged, and a second pattern, in which the left-half pattern and the right-half pattern are identically arranged, such that the registration error in the X-axis direction can be detected such that the registration error can be detected and that color registration can be controlled by removing the registration error with high precision, by using a simple circuit structure with a plurality of density sensors and a simplified procedure according to the formed patterns that cannot be realized in the methods and apparatuses in the relied upon prior art.

Claims 3-10 and 12 depend on claim 1 and are therefore believed to be allowable for at least the foregoing reasons.

Withdrawal of the foregoing rejections is requested.

Claims 19-26, 28, 37-42

Amended claim 19 recites: "...wherein the developing the registration pattern comprises arranging a first half and a second half of a first pattern and a second pattern, symmetrically to a center, respectively, in a scanning direction." Support for this amendment may be found in at least original claim 20.

The Office Action appears to rely on Figure 7 of Yamada to show this feature of claim 19. Figure 7 of Yamada shows various test patterns. The first set of test patterns are constructed by having each printhead print, alternatively, a "one dot--one space", "two dots--two spaces", or "four dots--four spaces" image (Figures 7A, 7C and 7E). A corresponding set of patterns is created by transversely shifting the output of one printhead for each of the above patterns by

one, two, and four pixels, respectively (Figures 7B, 7D and 7F). Yamada 9:64-10:4 and Figure 7. Further in Yamada, the density of the printed test patterns is measured by sensor 31. The location of the sensor measurement is shown in each pattern of Figure 7. The ink coverage ratio (area factor) per unit area between the patterns having a shift and the patterns without a shift is quite different. Hence, even if a sensor with a poor sensitivity is used, the relative differences in coverage are easily detected. Furthermore, a user can easily notice the differences visually.

Yamada, 10:5-10:11.

However, the text patterns shown in Figure 7 of Yamada, or discussed in the specification of Yamada, do not disclose the technical feature of claim 1 where the developing the registration pattern comprises arranging a first half and a second half of a first pattern and a second pattern, symmetrically to a center, respectively, in a scanning direction. Instead, in Yamada, a corresponding set of patterns is created by transversely shifting the output of one printhead for each of the above patterns by one, two, and four pixels. Further, this deficiency in Yamada is not cured by the secondary reference Miyazaki.

Claims 20-26, 28, 37-42 depend on claim 19 and are therefore believed to be allowable for at least the foregoing reasons. Claim 39 has been amended to improve the form of the claim. Further, claims 20-26, 28, 37-42 recite features that patentably distinguish over the relied upon references, taken alone or in combination. For example, claim 20 recites: "...putting the first half and the second half of the first pattern on top of the first half and the second half of the second pattern, respectively; in order to develop the registration pattern."

The Office Action relies on Figure 15A of Miyazaki to show this feature of claim 20. Figure 15A of Miyazaki illustrates a detection pattern for detecting color shift in the traverse direction. Specifically, in Figure 15A of Miyazaki, the four stripes of the respective blocks of the color detection pattern are printed so that they are aligned exactly in line both in the advance direction and in the traverse direction. The black detection pattern are printed such that blocks downstream of the "0" block are shifted leftward in increments of a minimum number of bits by which color shift can be detected and blocks upstream of the "0" block are shifted rightward in increments of the minimum number of bits. Therefore, if the exposed area of the carrier belt 12 becomes minimum at the second block upstream of "0" block, then it can be determined that the color detection pattern deviates two dots rightward with respect to the black detection pattern.

Miyazaki, 16:29-16:41 and Figure 15A.

However, Figure 15A of Miyazaki or the accompanying disclosure in the specification of Miyazaki does not discuss the technical feature of claim 20 of putting the first half and the

second half of the first pattern on top of the first half and the second half of the second pattern. It is respectfully submitted that Miyazaki only discusses that the four stripes of the respective blocks of the color detection pattern are printed so that they are aligned exactly in line both in the advance direction and in the traverse direction.

This technical feature of claim 20 of putting the first half and the second half of the first pattern on top of the first half and the second half of the second pattern provides a registration pattern such that the registration error can be detected and that color registration can be controlled by removing the registration error with high precision using a simple circuit structure with a plurality of density sensors and a simplified procedure according to the formed patterns.

Withdrawal of the foregoing rejections is requested.

Claims 44-46

Claims 44-46 have been cancelled.

CONCLUSION

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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